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THIS IS ONE VOLUME OF A SIX VOLUME SET WHICH INCLUDES:

VOLUME I: FIELD OPERATIONS (FO)
VOLUME II: GROUNDWATER (GW)
VOLUME III: GEOTECHNICAL (GT)
VOLUME IV: SURFACE WATER (SW)
VOLUME V: ECOLOGY (EE)
VOLUME VI: AIR (AP)

TABLE OF CONTENTS FOR VOLUME III: GEOTECHNICAL

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PER R.B. HOFFMAN, CLASSIFICATION OFFICE
JUNE 11, 1991

ADMIN RECORD

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ENVIRONMENTAL MANAGEMENT DOCUMENT CHANGE NOTICE (DCN)

Procedure Number 5-21000-OPS-GT.1, Rev. 2

Title	Date	DCN Number
Logging Alluvial and Bedrock Material	1/25/93 ~~1-5-93~~	5-21000-OPS-93.02

Expires 1-25-94

Procedure Revision Required ☒ Yes ☐ No

Scope Limitation none

Item Number	Page	Step or Paragraph	Changes (Use DCN CONTINUATION SHEET for Additional Space)
1	33 of 34	6.2.6 Logging Deliver-ables	Add Section 6.2.6 Logging Deliverables after section 6.2.5 as follows: Immediately after all lithologic core data and borehole/well data for a boring has been recorded on Logging Form GT.1A, the core logger will contact the appropriate EG&G oversight personnel to arrange for core log QC and sign off by an approved EG&G geologist. All data will then be entered into electronic format using the EG&G specified core log software program and format. Draft hard copy logs and the associated electronic file will be delivered to EG&G within three weeks of the sign off date. EG&G personnel will inspect the draft copies, and if necessary will stipulate changes. The subcontractor will make changes within a week of receipt and will deliver a second draft log in both hard copy and digital format. Final logs and core photographs will be delivered to EG&G at a time specified by the EG&G contract or project manager. All final logs and photographs will be delivered in the EG&G standard format.

Justification (Reason for Change – Provide Numbers To Reference Corresponding Items Above)

The above is currently standard practice.

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Concurrence	Organization	Req	Date	Concurrence	Organization	Req	Date
	QAPM	X	1/11/93	C Hodges	User	X	1/5/93
	EQS		1-12-93	E Chase	USER		1/5/93
	ECM	X	1/20/93				

Approval of Responsible Manager	Date	Is Posting Reqd?	If Yes, By What Date?	Date Posted
	1/5/93	☒ Yes ☐ No	UPON RECEIPT	

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ENVIRONMENTAL MANAGEMENT DOCUMENT CHANGE NOTICE (DCN)

Procedure Number 5-21000-OPS-GT.2, Rev 2

Title	Date	DCN Number
Drilling and Sampling using Hollow-stem Auger Techniques	1/25/93 ~~12/16/92~~	93.01 5-21000

Expires ~~12/16/93~~ 1/25/94

Procedure Revision Required [X] Yes [ ] No

Scope Limitation OU-4

Item Number	Page	Step or Paragraph	Changes (Use DCN CONTINUATION SHEET for Additional Space)
1	11 of 14	5.3.3	Third Bullet Add "... in unsaturated conditions."

Justification (Reason for Change -- Provide Numbers To Reference Corresponding Items Above)

1) The OU4 Phase I RFI/RI is a source and soils investigation, the Work Plan specifies that analytical soil samples will be collected in unsaturated surficial materials only. All drums generated during drilling operations will have at least one analytical samples.

Concurrence	Organization	Req	Date	Concurrence	Organization	Req	Date
[signature]	QAPM	X	1/22/93	[signature]	User	X	12/17/92
M.C. Broussard	EOM	X	1/20/93	[signature]	User	✓	12/24/92
				[signature]	EQM	✓	1/5/93
				[signature]	EQS	✓	1/8/93

Approval of Responsible Manager	Date	Is Posting Reqd?	If Yes, By What Date?	Date Posted
[signature]	12/17/92	[X] Yes [ ] No	upon receipt	

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ENVIRONMENTAL MANAGEMENT DOCUMENT CHANGE NOTICE (DCN)

Procedure Number 5-21000-OPS- ~~GT.6, Rev. 2~~

Title	Date	DCN Number
Monitoring Wells and Piezometer Installation	~~01/28/93~~ DJH 1/28/93	5-21000-OPS- 93.02

Expires ~~01/28/94~~ DJH 1/28/93 1/28/94 Procedure Revision Required [X] Yes [ ] No

Scope Limitation ~~Operable Unit Number 5~~ None DJH 1/28/93

Item Number	Page	Step or Paragraph	Changes (Use DCN CONTINUATION SHEET for Additional Space)
1	16	5.4 5 DJH 1/28/93	**Insert following text as Section 5.4.** **5.4 WELL POINT INSTALLATION** **This Section describes the procedures used for installing well points. Before installation, sites will be located, numbered, and identified using stakes (or paint sticks on paved surfaces). Refer to SOP GT.10, Borehole Clearing, for more information regarding clearing the sites of underground obstructions.** DJH 1/28/93 **After test sites have been located and cleared, an exclusion zone will be established according to the project Health and Safety Plan. The procedure for installing well points at a specific location is as follows:**

Justification (Reason for Change - Provide Numbers To Reference Corresponding Items Above)

More cost effective method than piezometers installed by conventional drilling methods for measuring water levels.

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Concurrence	Organization	Req	Date	Concurrence	Organization	Req	Date
	QAPM	X	1/28/93		User	X	1/28/93
	EOM	X	1/28/93		UBER	X	1/28/93
					EQS	V	1/28/93

Approval of Responsible Manger	Date	Is Posting Reqd?	If Yes, By What Date?	Date Posted
	1/28/93	[X] Yes [ ] No	upon receipt	

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DOCUMENT CHANGE NOTICE (DCN)
(Continuation Sheet)

GT.6R2 DCN no. 93-05

Procedure no.	Title
5-21000-OPS-GT.6, Rev. 2	*Monitoring Wells and Piezometer Installation*

Scope Limitation *Operable Unit Number 5*

Item Number	Page	Step or Paragraph	Changes (Use DCN CONTINUATION SHEET for Additional Space)
1	*16*	*5.4*	1. Decontaminate the rig and downhole equipment. See SOP FO.3, General Equipment Decontamination, and SOP FO.4, Heavy Equipment Decontamination for specific details regarding decontamination. 2. Set up the rig to obtain a thrust direction as close to vertical as possible. 3. Advance threaded expendable point by either hydraulically pushing or hammering to desired depth. 4. At locations within an IHSS, monitor the breathing zone near the rig for volatile organic compounds. 5. Insert the end of the hand-perforated tubing (Polyethylene or Teflon) with a threaded stud attached into the probe rods. Thread this into the expendable drive point. Length of perforated tubing will range between one and five feet based upon magnitude of anticipated water level fluctuations. 6. Hydraulically withdraw probe rods from hole.

Justification (Reason for Change - Provide Numbers To Reference Corresponding items Above)

More cost effective method than piezometers installed by conventional drilling methods for measuring water levels.

DOCUMENT CHANGE NOTICE (DCN)
(Continuation Sheet)

GT.6, R2 DCN no. 93.02E

Procedure no.	Title
S-21000-OPS-GT.6, Rev. 2	*Monitoring Wells and Piezometer Installation*

Scope Limitation *Operable Unit Number 5*

Item Number	Page	Step or Paragraph	Changes (Use DCN CONTINUATION SHEET for Additional Space)
1	16	5.4	7. Place 10/20 silica sand filter pack to approximately six inches above the top of the screen while keeping tension on the tubing. Place at least six inches of granular bentonite seal above filter pack. 8. Install four-inches long, one-inch diameter PVC casing with threaded or slip cap as protective well-point surface casing. Protective casing will be nearly flush with the ground surface. 9. Install four-feet long, three-inch diameter steel post adjacent to protective casing to act as marker and traffic barrier. Post should be installed such that three feet are above ground. 10. Develop well point with peristaltic or inertia pump. Since these well points are only for measuring water levels, it is not necessary to measure all the parameters referenced in SOP GW.4, Well Development. 11. Survey top of protective casing because well-point tubing is too flexible. Refer to SOP GT.17, Land Surveying, for more information regarding site surveying procedures.

Justification (Reason for Change - Provide Numbers To Reference Corresponding Items Above)

More cost effective method than piezometers installed by conventional drilling methods for measuring water levels.

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ENVIRONMENTAL MANAGEMENT DOCUMENT CHANGE NOTICE (DCN)

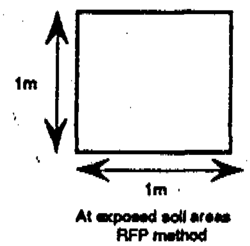
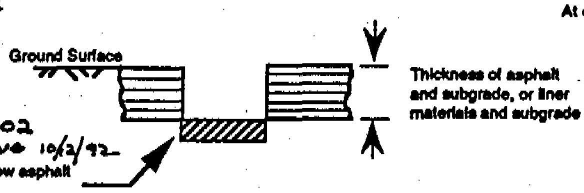
Procedure Number 5-21000-OPS-GT.8-Rev.2

Title	Date	DCN Number
Surface Soil Sampling	1/25/93 ~~12/16/92~~ mcb	93.03 5-21000-OPS-GT.08, R2-

Expires ~~12/16/93~~ mcb 1/25/94

Procedure Revision Required [X] Yes [ ] No

Scope Limitation Industrial Area OU4s, OU4

Item Number	Page	Step or Paragraph	Changes (Use DCN CONTINUATION SHEET for Additional Space)
1	4 of 19	5.0	Second sentence: Insert "...as appropriate..."after "... used...".
2	14 of 19	1st Paragraph	First sentence: Replace "Ten... " with "Five...". Second sentence: Replace "two one-meter squares which are spaced one meter apart, "with "... a one meter square template."
~~3~~	~~15~~	~~5.2.4~~	~~Add after second sentence of first paragraph: "This method will be used to collect soil samples where the around surface has been covered with paving or liners. Remove the paving or liner and base material prior to sample collection."~~ 
3	15 of 19	5.2.4	Diagram → illustrates item #3 in DCN 92.02 to GT.8, effective 10/2/92. 

Justification (Reason for Change – Provide Numbers To Reference Corresponding Items Above)

1. The CDH method will not be used in all instances in InterAgency Agreement (IAG) projects.
2. In accordance with the September 1, 1992 letter from CDH (attached) pff the sampling approach reflected in the DCN complies with the CDH recommendations for exposed soil locations in industrial area OU's.

Concurrence	Organization	req.	Date	Concurrence	Organization	req.	Date
	QAPM	X		R T Ogg	User	X	12/18/92
M C Broussard	EOM	X	1/20/93	G L Pamm	User	X	12/24/92
				Donna Sikes mcb	EQM	X	1/5/93

Approval of Responsible Manager	Date	Is Posting Reqd?	If Yes, By What Date?	Date Posted
Randy T. Ogg	12/18/92	[X] Yes [ ] No	upon receipt	

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JAN 25 1993

DCN GT.8--93.03

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COLORADO
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OF HEALTH

ROY ROMER
Governor

PATRICIA A. NOLAN, MD, MPH
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September 1, 1992

Mr. Frazer Lockhart
U. S. Department of Energy
Rocky Flats Office
P.O. Box 928
Golden, Colorado 80402-0928

RECEIVED
U.S.D.O.E.
R.F.O. - MAIL ROOM
1992 SEP -8 A 9:23

RE: Soil Sampling Methodology for Industrialized Area OUs

Dear Mr. Lockhart,

As you are aware, RFI/RI Workplans for all of the OUs within the industrialized areas of the Rocky Flats Plant are either under review or recently reviewed. Only two of these workplans (OUs 9 and 10) have been approved. During our review of the workplans, we have noticed many inconsistencies in the surficial soil sampling proposed. We believe these inconsistencies are caused by various subcontractors applying the standard operating procedure for surficial soil sampling (SOP GT.8) differently.

Therefore, in an effort to correct the workplan inconsistencies, we are taking this opportunity to provide input to DOE and EG&G on the soil sampling program that we feel needs to be included in the industrialized area workplans. This input concerns when and how different sampling procedures included in SOP GT.8 will be employed rather than the equipment and the procedural methods used. Much of this information was originally included in Technical Memorandum 5 to the Phase III RFI/RI Workplan for OU 1. We have modified it slightly for application within industrialized area IHSSs.

As you will see from these proposals, the Division has not distinguished between radionuclide and non-radionuclide samples. This was done to keep implementation simple as well as to keep costs as low as possible and because we feel that one sample set can be successfully analyzed for all analytes. We recognize that further research into sampling techniques and data results may show that rad and non-rad sampling should be different. If so, we will defer to whatever changes are needed and can be agreed upon.

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MHS
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The items important to CDH for inclusion in the workplans are as follows:

1) The CDH method for surficial soil sampling was designed for evaluating large tracts of land which are remote from the source of windblown contamination. For these reasons, we do not believe this method is applicable for evaluating most IHSSs within the industrialized portions of the plant.

2) Screening surveys are proposed for the first stage of RFI/RI field work in the workplans. The Division believes that the screening surveys should always include, in addition to the radiation and soil gas surveys, a surficial soil sampling survey carried out across each IHSS or area of concern on an appropriate grid. The soil samples should be taken in the following manner:

- in an area where the ground surface is covered with paving, soil samples should be taken using the "Grab Sampling" method presently outlined in SOP GT.8. These samples should be taken from the soil substrate underlying whatever base materials are immediately beneath the paving and would be located, when possible, in holes cut through the paving for the soil gas survey.
- in an area where the ground surface is unpaved, soil samples should be taken by the "RFP method" presently outlined in SOP GT.8 using the 10 cm x 10 cm x 5 cm sampling jig. However, the Division proposes that each point on the sampling grid be overlain with the one square-meter template proposed in TM 5. In this case, five discrete subsamples will be collected from each grid point and composited into a 2500 cm^3 sample. Details of this procedure need to be incorporated into SOP GT.8.

See RFM or Im sq Iggy L. What prch

3) In some of the workplans, vertical soil profile samples are proposed for use in conjunction with the rad surveys. We believe this type of sampling is a good idea because it will provide further understanding of both the rad survey results as well as rad contamination distribution. Vertical soil profiles, with samples collected from intervals consistent with those proposed in SOP GT.7, and analyzed for radionuclides, should be included in all industrialized Ous. Vertical profile sampling will need to be coordinated between those doing the soil sampling and those doing the radiation surveys. Procedures for vertical profile sampling should be incorporated into SOP GT.8 even if they are also included in radiation survey SOPs.

4) The Division proposes that all of the soil samples collected be analyzed for a complete suite of contaminants appropriate for the history of the IHSS. In formulating this analytical suite, consideration should be given to radionuclides, metals, and semi-volatiles. The reasons that the Division considers a comprehensive

analysis necessary are:
- there is currently no other way to screen for metals contamination using other survey types,
- the rad surveys cannot assess radionuclide contamination beneath paving, and
- soil gas surveys are not always effective for organic compounds with relatively low volatility.

5) After the soil sampling results from the first stage of the RFI/RI are analyzed, additional soil sampling may be necessary in subsequent RFI/RI stages. Unless specifically approved by EPA and CDH, these samples should be taken in the same manner as those taken previously.

While the Division feels strongly that a consistent soil sampling program needs to be developed for the entire industrialized area of RFP, the points included in this letter are open for discussion. However, the Final OU 8 RFI/RI Workplan is due to us September 29, 1992. If discussions have not taken place by that date, we expect these points to have been included in the OU 8 workplan and all other workplans in preparation. In addition, SOP GT.8 needs minor revisions as indicated.

If you have any questions regarding these matters, please call Joe Schieffelin of my staff at 331-4421.

Sincerely,

Gary W. Baughman

Gary W. Baughman, Chief
Facilities Section
Hazardous Waste Control Program

cc: Martin Hestmark, EPA

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ENVIRONMENTAL MANAGEMENT DOCUMENT CHANGE NOTICE (DCN)

DCN to SOPGT.18

Procedure Number 5-21000-OPS-GT.18, Revision 2

Title	Date	DCN Number
Surface Geophysical Surveys	1-25-93 ~~12/8/92~~ MCB	5-21000-OPS-GT.18 DCN ~~92.01~~ 93.01

Expires ~~12/8/93~~ MCB 1-25-94 | Procedure Revision Required [X] Yes [ ] No

Scope Limitation OU4

Item Number	Page	Step or Paragraph	Changes (Use DCN CONTINUATION SHEET for Additional Space)
~~1~~	~~DCN 92.01~~	~~Scope Limitation~~	~~Add OU4 to Scope Limitation for DCN of 9/17/92, described in DCN 92.01, 9/17/92~~ magnetic survey
1	24	5.4	Adopt Section 5.4 Magnetics attached to DCN ~~of~~ 92.01 of 9/17/92, with following exceptions:
1a			-Section 5.4.2.2. Add sixth bullet that states "Initate the magnetic survey after a radiation survey has been completed in the Solar Ponds area."
1b			-Section 5.4.2.2 - Second bullet in second set. Add "...and in the Solar Ponds area."
1c			-Section 5.4.2.2 - Add ~~ninth~~ bullet to second set between bullets 5 and 6: "Spacing between adjacent grid - traverse lines will be 10 feet in Solar Ponds area."
1d			Sect. 5.4.2.2 - Add to end of third bullet in first set: "....or other metallic objects. The site should be cleared with a portable magnetometer.
1e			Sect. 5.4.2.2 - Insert in bullet 4 of first set: "including watches, belt buckles, ..."

Justification (Reason for Change -- Provide Numbers To Reference Corresponding Items Above)

The OU4 work plan requires a magnetic survey (Surface Geophysics) in the immediate Solar Ponds area, but magnetic surveys are not addressed in the surface geophysics SOP. The DCN prepared for OU5 is applicable, with only minor modifications as noted above.

additions and modifications are shown on attachment.

Concurrence	Organization	Req	Date	Concurrence	Organization	Req	Date
	QAPM	X		R T Ogg	User	X	12/18/92
M. Chromsod	EOM	X	1/20/93	A. L. Pr[illegible]	User	X	12/24/92
				Donna Sinks	EOM	X	1/5/93

Approval of Responsible Manager	Date	Is Posting Reqd?	If Yes, By What Date?	Date Posted
Randy T. Ogg	12/18/92	[X] Yes [ ] No	upon receipt	

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5.4.2.2 Field Procedures

A standard field procedure is described below. Prior to magnetic data collection, five preliminary procedures must be conducted. These are:

* Design the appropriate field survey parameters given the purpose of coverage, contained areas of magnetic interference, grid-traverse spacing, direction of traverse, magnetometer reading interval.

* The surface geophysical survey grid-traverse lines will be controlled from the surveyed baseline provided by RFP plant personnel. The provided baseline will be staked each 25 feet. At these stakes grid-traverse line endpoints will be marked with flagged lath. The baseline and grid-traverse line stations of the magnetic survey will be transferred to the appropriate base map.

* The magnetic base station location will be selected, after consulting site utility maps, to assure minimal magnetic interference due to electric power lines, railroad, fencing, vehicular traffic, subsurface utilities, and air monitoring stations, or other metallic objects. The site should also be cleared with a portable magnetometer.

* The geophysical field instrument operator will check that personal clothing including watches, and boots, do not contain interfering ferromagnetic materials. belt buckles

* Initiate the magnetic survey only after an in situ gamma radiation survey has been completed by RFP plant personnel at each IHSS 115 and 133 groups.

* Initiate the magnetic survey after a radiation survey has been completed in the Solar Ponds area.

Design of appropriate field parameters must consider the following:

* The roving magnetometer will be suspended on a staff 8 feet above ground surface at each station on the IHSS 115 survey area.

* The roving magnetometer will be suspended on a staff 4 feet above ground surface at each station on the IHSS 133 group survey area and in the Solar Ponds area.

* Spacing between stations along each grid-traverse line stations will be 10 feet.

* Spacing between adjacent grid-traverse lines will be 25 feet at the IHSS 115 survey area.

* Spacing between adjacent grid-traverse lines will be 12 1/2 feet at the IHSS 133 group survey area.

* Spacing between adjacent grid-traverse lines will be 10 feet in the Solar Ponds area.

* Grid-traverse line will be extended an additional 50 feet along significant anomaly indications. Where such anomalies are attributed directly to known pipeline, fences, or other visible and mapped anthropogenic ferromagnetic structures, the survey need not be extended.